

WHAT IS CLAIMED IS:

1. A wireless communications system in which a wireless access unit (hereinafter, master station) for managing a wireless network and one or more other wireless access units (hereinafter, slave stations) are on the wireless network, and data of one or
5 a combination of communication types including:

CBR (constant in transmission speed and data period);

VBR (variable in transmission speed and constant in data period);

ABR (constant in transmission speed and variable in
10 data period); and

UBR (variable in transmission speed and data period)
is transmitted between the master station and one of the slave stations or between the slave stations,

said master station comprising a scheduler for regularly
15 determining (scheduling) transmission band assignment including information about transmission timing of the data, a transmission amount, and the master station or any of the slave stations that is allowed to access,

in order to make a request for setting a communication link
20 for data transmission, said master station providing said scheduler with a communication parameter for the data transmission,

in order to make the request for setting the communication

link for data transmission, said slave station providing said
25 scheduler with a communication parameter for the data
transmission by transmitting a communication parameter for the
data transmission to said master station by using a request
packet,

said master station giving the transmission band assignment
30 scheduled by said scheduler to said slave station by using a band
assignment packet and recognizing the transmission band
assignment, and

a transmitting station (said master station or said slave
station that sends the data) and a receiving station (said master
35 station or said slave station that receives the data) between
which the communication link is set by said transmission band
assignment carrying out bidirectional data transmission
according to the transmission band assignment.

2. The wireless communications system according to claim
1, wherein

when the communication type indicated by said communication
parameter is CBR, VBR, or ABR, said scheduler rejects the request
5 for setting the communication link if a transmission bandwidth
required for the communication link exceeds an unused
transmission bandwidth (empty bandwidth), and receives the
request for setting the communication link and updates a sum of
transmission bandwidths in use for already-allocated

10 communication links (used bandwidth) if otherwise,

when the communication type indicated by said communication parameter is UBR, said scheduler receives the request for setting the communication link irrespectively of said empty bandwidth.

3. The wireless communications system according to claim 1, wherein

said scheduler

5 recognizes a state of data receiving for each communication link by receiving, from said receiving station, an acknowledgement packet indicating the state of data receiving as to the bidirectional data transmission in which the communication link is set, and

determines said transmission band assignment so as to
10 reflect said state of data receiving and satisfy said previously-set communication parameters.

4. The wireless communications system according to claim 2, wherein

for setting the communication link,

if said communication type is CBR, said scheduler
5 multiplies a speed parameter indicating a transmission speed by a period parameter indicating a data occurrence period to calculate a data amount parameter indicating an amount of data to be transmitted,

if said communication type is VBR, said scheduler divides
10 said data amount parameter by said period parameter to calculate
said speed parameter, and

if said communication type is ABR, said scheduler divides
said data amount parameter by said speed parameter to calculate
said period parameter.

5. The wireless communications system according to claim
1, wherein

when the communication type indicated by said communication
parameter is CBR, VBR, or ABR,

5 said scheduler calculates a difference T_b between a present
time or a reference time, which is a transmission time of the
assigned transmission band, and a time when data transmission on
each communication link has been completed,

when said difference T_b is positive, for each communication
10 link, said scheduler

calculates a difference V_{dd} between a data amount
parameter included in said communication parameter and indicating
an amount of data to be transmitted and an amount of data already
received by said receiving station (received data amount),

15 calculates a priority value by subtracting an overhead
bandwidth from an entire transmission bandwidth of the system to
obtain an effective transmission bandwidth, multiplying the
effective transmission bandwidth by said difference T_b to obtain

a value, then dividing said difference V_{dd} by the value, and

20 selects one or more communication links whose priority value is not less than a predetermined value and predetermined in decreasing order or whose priority value is not less than a random number generated within a predetermined range as the communication link assigned the transmission band, and

25 when said difference T_b is not more than 0, the scheduler selects one or more communication links in increasing order of said difference T_b as the communication link assigned the transmission band.

6. The wireless communications system according to claim 5, wherein

 said scheduler updates said received data amount of each communication link based on an acknowledgement packet indicating
5 a state of data receiving transmitted from said receiving station.

7. The wireless communications system according to claim 5, wherein

 said scheduler updates said received data amount of each communication link by using the transmission amount determined
5 by said transmission band assignment, and corrects said received data amount to an effective value based on an acknowledgement packet indicating a state of data receiving transmitted from said receiving station.

8. The wireless communications system according to claim 5, wherein

when said difference V_{dd} of the communication link for scheduling is negative, said scheduler carries out any one of operations of deleting a setting of the communication link, resetting the communication link by the communication parameter currently used, and resetting the communication link with the communication type changed to UBR.

9. The wireless communications system according to claim 1, wherein

when the communication type indicated by said communication parameter is UBR, said scheduler carries out the transmission band assignment according to an order in which the communication link has been set (requested) or a priority order of the priority parameter included in said communication parameter.

10. The wireless communications system according to claim 9, wherein

when a period parameter indicating a data period is further provided, said scheduler calculates a difference T_b between a present time or a reference time, which is a transmission time of the assigned transmission band, and a time when data transmission on each communication link has been completed, and carries out transmission band assignment only when said

difference T_b is not more than 0.

11. The wireless communications system according to claim 9, wherein

when a data amount parameter indicating an amount of data to be transmitted is provided, if an amount of data already
5 received by said receiving station (received data amount) exceeds the data amount parameter, said scheduler deletes setting of a relevant communication link.

12. The wireless communications system according to claim 1, wherein

when detecting that the transmission band of the set communication link is not used, said scheduler deletes setting
5 of the communication link.

13. The wireless communications system according to claim 3, wherein

when assigning data packet transmission from said transmitting station to each transmission band with the
5 communication link set therein a predetermined number of times, said scheduler assigns transmission of said acknowledgement packet from said receiving station at least once.

14. The wireless communications system according to claim

1, wherein

said scheduler carries out transmission band assignment by dynamically changing a data packet based on communication quality
5 of a wireless channel so that a packet length is shortened when more communication errors occur, and lengthen when fewer.

15. The wireless communications system according to claim 1, wherein

said master station gives, to said slave station, said band assignment packet with a probability parameter for access control
5 of said request packet added thereto, and

said slave station transmits said request packet only when said given probability parameter exceeds a random number generated within a range of values that said probability parameter can take.

16. The wireless communications system according to claim 1, wherein

when transmission band assignment for data transmission has been carried out by said scheduling, said transmitting station
5 divides the data into a specified length for generating data packets for transmission.

17. The wireless communications system according to claim 1, wherein

when a plurality of communication links are set to said transmitting station, if there is no data packet to be transmitted on a specific communication link, said transmitting station
5 transmits a data packet to be transmitted on another communication link by using a transmission band assigned to the specific communication link.

18. The wireless communications system according to claim 1, wherein

said transmitting station transmits said request packet by using a transmission band in which a communication link is set.

19. The wireless communications system according to claim 1, wherein

said master station transmits, to said slave station, said band assignment packet with a transmission time stamp value
5 indicating a transmission time added thereto, and

said slave station synchronizes a time counter thereof with a time counter of said master station by using said transmission time stamp value.

20. The wireless communications system according to claim 1, wherein

said slave station transmits, to said master station, said request packet with a transmission time stamp value indicating

5 a transmission time added thereto,

when receiving said request packet with said transmission time stamp value added thereto, said master station calculates a space propagation delay time from a difference between a receive time and the transmission time stamp value, and gives, to said
10 slave station, said band assignment packet including an adjusted value according to the space propagation delay time, and

said slave station corrects transmission timings of said request packet and the data packet according to said given adjusted value.

21. The wireless communications system according to claim 1, wherein

said receiving station indicated by a destination address of said band assignment packet

5 when receiving said band assignment packet correctly, carries out intermittent receiving in timing when the data packet transmitted from said transmitting station and said band assignment packet next transmitted from said master station are received, and

10 when not receiving said band assignment packet correctly, carries out intermittent receiving only after receiving said band assignment packet next correctly.